

# Breast Is Best for Babies

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Breastfeeding is the optimal method of infant feeding. Breast milk provides almost all the necessary nutrients, growth factors and immunological components a healthy term infant needs. Other advantages of breastfeeding include reduction of incidences and severity of infections; prevention of allergies; possible enhancement of cognitive development; and prevention of obesity, hypertension and insulin-dependent diabetes mellitus. Health gains for breastfeeding mothers include lactation amenorrhea, early involution of the uterus, enhanced bonding between the mother and the infant, and reduction in incidence of ovarian and breast cancer. From the economic perspective, breastfeeding is less expensive than formula feeding. In most cases, maternal ingestion of medications and maternal infections are not contraindications to breastfeeding. Breastfeeding, however, is contraindicated in infants with galactosemia. The management of common breastfeeding issues, such as breast engorgement, sore nipples, mastitis and insufficient milk, is discussed. Breastfeeding should be initiated as soon after delivery as possible. To promote, protect and support breastfeeding, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) developed the Baby-Friendly® Hospital Initiative (BFHI) 10 Steps to Successful Breastfeeding. Healthcare professionals have an important role to play in promoting and protecting breastfeeding.

**Key words:** breastfeeding ■ advantages ■ promote ■ support

The advantages of breastfeeding are many and have been well documented in the literature.<sup>1-5</sup> Breastfeeding is universally accepted as the optimal method of infant feeding for the first year of life and thereafter as long as is beneficial to the mother-infant dyad.<sup>1-5</sup> Studies have shown that benefits increase with the duration and exclusivity of breastfeeding up to six months.<sup>6</sup> As such, the medical profession's obligation in the promotion of breastfeeding is clear and unequivocal. Healthcare professionals who deal with lactating mothers must familiarize themselves with various aspects of breastfeeding and be well versed in the handling of potential problems associated with breastfeeding.

## PHYSIOLOGY OF LACTATION

The first half of pregnancy is characterized by growth and proliferation of the ductal system, arborization of the alveolar structure and formation of lobules. Prolactin, which is secreted by the anterior pituitary gland, stimulates the secretory cells in the alveoli to secrete milk. Lactation during pregnancy is inhibited by high levels of estrogen and progesterone, which inhibit the release of prolactin and interfere with the action of prolactin at the alveolar cell receptor level. As the estrogen and progesterone decline abruptly in the postpartum period, the anterior pituitary gland releases very large amounts of prolactin, which stimulates the alveoli to produce significant amounts of milk. The most important factor in an ongoing release of prolactin is nipple stimulation from suckling.<sup>7</sup> In response to suckling, oxytocin is released by the posterior pituitary gland. Oxytocin causes the myoepithelial cells surrounding the alveoli to contract and propel milk to the milk sinuses in the areolar area. This milk ejection (let-down reflex) is usually described as a tingling sensation.

Endocrine control is supplanted by autocrine control as the mother's baseline levels of prolactin return to more normal levels at about three months postpartum.<sup>8</sup> At this time, it is the removal of milk (in particular, a feedback inhibitor of lactation in the milk) from the breast that maintains the supply of milk.<sup>8</sup> The more the mother empties her breast, the more milk is produced.<sup>8</sup>

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## ADVANTAGES OF BREASTFEEDING

### Nutritional Considerations

Human milk contains the appropriate proportions of protein, carbohydrates, fat, minerals and vitamins for optimal growth, with the exception of vitamins D and K.<sup>9,10</sup> All newborn infants should receive vitamin K at birth, and breastfed infants should receive vitamin-D supplementation until the diet provides an adequate source of vitamin D. The whey/casein ratio of human milk is approximately 72:28, whereas the whey/casein ratio of whole cow's milk is approximately 18:82.<sup>10</sup> The whey/casein ratio in infant formulas range through 18:82, 60:40 or 100% whey. Whey proteins are acidified in the stomach, forming soft flocculent curds that are more easily digested than casein, which forms tough, hard-to-digest curds in the stomach. The amino acids taurine and cysteine are present in much higher concentrations in human milk than in whole cow's milk. These amino acids may be essential for premature infants. On the other hand, the amounts of methionine and phenylalanine, which are poorly tolerated by some infants, are found in lower concentrations in human milk.<sup>11</sup>

The renal solute load of human milk is approximately one-third that of whole cow's milk. The small renal solute load helps to protect the infant's kidneys from needing to excrete a large solute load, thereby leaving a wider margin of safety in situations that may lead to dehydration.<sup>1</sup>

Lactose accounts for most of the carbohydrates in human milk. Lactose enhances calcium and iron absorption and promotes the growth of lactobacilli, which in turn helps prevent the growth of pathogenic flora in the gut. Lactose metabolizes readily to glucose and galactose, important sources of energy for the growing infant. Glucose is an essential fuel for the brain. Human milk ensures a supply of galactocerebrosides, which are essential to brain development.

Triglycerides, the main constituent of milk fats, are readily broken down into free fatty acids and glycerol by lipase. Human milk provides generous amounts of essential fatty acids (linoleic acid and linolenic acid), long-chain polyunsaturated fatty acids (docosahexaenoic acid and arachidonic acid) and cholesterol.

**Table 1. Drugs Usually Contraindicated during Breastfeeding**

1. Cytotoxic
2. Radioactive agents
3. Illegal drugs of abuse
4. Phenindione
5. Chloramphenicol
6. Tetracycline

Human milk also contains nucleotides, which are necessary for energy metabolism, growth and maturation of the gastrointestinal tract, enzymatic reactions and enhanced immune function.

Although human milk has only a small amount of iron (0.3 mg/L to 1 mg/L), iron in human milk is highly bioavailable, possibly because of the lower calcium and phosphorous content and the presence of lactoferrin.<sup>12</sup> Approximately 50% of the iron in the human milk is absorbed, compared to about 10% of that in whole cow's milk.

Milk from mothers of preterm infants contains higher concentrations of fat, protein and sodium but slightly lower concentrations of lactose, calcium and phosphorous, compared to milk from mothers of term infants.<sup>10</sup> For the very premature infants, human milk alone does not meet the high demands of growth.<sup>13</sup> To correct the nutritional inadequacies in the very premature infants, fortification of human milk may be required.<sup>9,10,14</sup> Commercial human milk fortifiers are available in powdered or liquid form.<sup>13</sup>

### Immunological and Anti-Infective Advantages

The protective properties of human milk can be divided into cellular or humoral factors. Cellular components, including T and B-lymphocytes, macrophages and neutrophils, are at especially high levels in colostrum, and they persist in milk in lower concentrations but in activated forms for as long as breast milk is produced.<sup>15</sup> Humoral factors include immunoglobulins, lysozyme, nucleotides, lactoferrin, complements, bifidus factor, interferon, lactoperoxidase, oligosaccharides, vitamin B<sub>12</sub> binding protein and epidermal growth factor. Secretory IgA predominates in human milk and plays a vital role in the provision of local protection to the mucosal membrane. Human milk contains glucosamines, which promote the growth of lactobacillus bifidus, which helps to prevent the growth of pathogenic flora in the gut. Breastfeeding decreases the incidence and/or severity of gastrointestinal tract infection,<sup>16</sup> lower respiratory tract infection,<sup>4,17</sup> otitis media,<sup>17,18</sup> urinary tract infection,<sup>19,20</sup> meningitis,<sup>21</sup> septicemia and necrotizing ente-

**Table 2. Signs of Successful Breastfeeding in the Early Weeks**

1. Satisfactory weight gain
2. Audible swallowing
3. At least eight feedings per day
4. At least two bowel movements per day
5. At least six wet diapers per day
6. Urine pale and odorless
7. Infant alert and active

rocolitis.<sup>22</sup> There is also evidence that breastfeeding actively stimulates the immune system of the infant.<sup>23</sup>

## Prevention of Allergies

Breastfeeding does have a protective effect on the incidence of atopy in infants with a genetic predisposition to atopy.<sup>24-26</sup> A meta-analysis of 12 prospective studies (n=8,183) suggests that exclusive breastfeeding during the first months of life is associated with lower asthma rates during childhood.<sup>25</sup> In high-risk infants, exclusive breastfeeding with delayed introduction of solid foods (until six months of age) may delay, or possibly prevent, the onset of food allergy in some children.<sup>27,28</sup> Because small amounts of food antigens ingested by the mother are excreted in breast milk, avoidance of allergenic foods by lactating mothers is often recommended.<sup>27</sup> Infants with elevated cord serum IgE and a positive family history of atopy are at risk for the development of atopic disease. Breastfeeding protects against the development of allergy by several mechanisms. Colostrum is responsible for sealing the gut, thereby preventing the entrance of large foreign proteins and thus preventing an allergic response. Colostrum also prevents the adherence of pathogens. Breastfeeding reduces the amount of foreign protein in an infant's gastrointestinal tract and passively transfers maternal IgA to the infant, thereby protecting the infant's gastrointestinal tract from absorbing antigens. Transfer of cell-mediated immunity from mother to infant stimulates IgA synthesis in the infant.<sup>29</sup> In addition, epidermal growth factor present in human milk hastens maturation of intestinal mucosa and epithelium, thereby strengthening the mucosal barrier to antigen.<sup>30</sup> Finally, several studies have shown that respiratory and gastrointestinal infections may lead to the development of allergic diseases.<sup>29</sup> Thus, an allergy-

preventive effect of breastfeeding may be secondary to a reduction in the number of infections in the infant.

## Enhanced Cognitive Development

Children who are breastfed have higher cognitive function than children who are formula-fed.<sup>31,32</sup> Anderson et al. performed a meta-analysis on 11 studies that reported unadjusted and covariate-adjusted findings comparing cognitive development of breastfed and formula-fed infants.<sup>31</sup> After adjusting for possible confounding variables, such as socioeconomic status and maternal education, the "cognitive development score" was 3.16 points higher in breastfed infants (n=7,081) compared with formula-fed infants.<sup>31</sup> The meta-analysis also found that the duration of breastfeeding correlated with development and cognitive outcome. A recent study suggests that the effect may last well into adulthood.<sup>32</sup>

## Prevention of Obesity

Breastfeeding reduces the risk of childhood obesity to a moderate extent.<sup>33-35</sup> Of 11 studies that examined prevalence of obesity in children >3 years of age that had a sample size of ≥100 per feeding group, eight showed a lower risk of obesity in children who had been breastfed after controlling for potential confounders.<sup>33</sup> The three "negative" studies lacked information on the exclusivity of breastfeeding.<sup>33</sup> Childhood obesity may persist into adult obesity with associated morbidity, such as type-2 diabetes mellitus, hypertension and hypercholesterolemia.<sup>33,34</sup>

## Prevention of Insulin-Dependent Diabetes Mellitus

An association between early exposure to cow's milk protein and risk for insulin-dependent diabetes

**Table 3. Ten Steps to Successful Breastfeeding**

Every facility or agency providing maternity services and care of newborn infants should:

1. Have a written breastfeeding policy that is routinely communicated to all health-care staff.
2. Train all health-care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk unless medically indicated.
7. Practise rooming-in (allow mothers and infants to remain together 24 hours a day).
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Adapted from: WHO/UNICEF. Protecting, promoting and supporting breastfeeding: The special role of maternity services. A joint WHO/UNICEF statement. *Int J Gynaecol Obstet.* 1990;31(suppl 1):171-183.<sup>72</sup>

mellitus has been reported in many studies.<sup>36,37</sup> Bovine serum albumin may provoke an immunological response in genetically susceptible individuals, which then cross-reacts with a beta-cell surface protein, p 69.<sup>36,37</sup> The expression of this protein on the surface of beta cells is believed to mediate their destruction by exposing them to immune attack.<sup>37</sup> Destruction of beta cells may lead to the development of diabetes mellitus. The American Academy of Pediatrics recommends breastfeeding and avoidance of commercially available cow's milk and products containing intact cow's milk protein during the first year of life in families with a strong history of insulin-dependent diabetes mellitus.<sup>38</sup>

### Prevention of Hypertension

There is evidence that breastfeeding may protect against high blood pressure in later life.<sup>39-41</sup> In a recent study, Martin et al. found that for every three months of breastfeeding, the children had a 0.2-mm Hg reduction in systolic blood pressure.<sup>41</sup> The reduction in blood pressure, though small, is significant and may have important public health implications.<sup>41</sup>

### Prevention of Certain Gastrointestinal Diseases

Several studies have suggested that breastfeeding may prevent or delay the onset of celiac disease,

Crohn's disease and ulcerative colitis.<sup>42-44</sup> Further studies are necessary before a definitive conclusion can be made. Nevertheless, it is prudent to recommend that mothers with a family history of these conditions breastfeed exclusively for six months.

### Prevention of Sudden Infant Death Syndrome

Several studies have suggested that breastfeeding may be protective against sudden infant death syndrome.<sup>45,46</sup> None of the studies, however, has controlled for the sleeping position and household smoke exposure.<sup>3</sup> Thus, a casual relationship remains unproven.

### Maternal Health Benefits

Health gains for breastfeeding mothers include lactation amenorrhea, decreased postpartum bleeding, early involution of the uterus, postpartum weight loss, and protection against ovarian cancer and breast cancer.<sup>30,47-49</sup> The Collaborative Group on Hormonal Factors in Breast Cancer combined data from 47 epidemiological studies (n=50,302) conducted in 30 countries to examine the relation between breastfeeding and breast cancer.<sup>50</sup> The group found that the relative risk of breast cancer decreased by 4.3% (95% CI 2.9–5.8; p<0.0001) for every 12 months of breastfeeding in addition to a decrease of 7% (5–9; p<0.0001) for each birth. The

**Table 4. Summary of the WHO/UNICEF International Code of Marketing of Breast Milk Substitutes and Subsequent WHA Resolutions**

1. No advertising of products under the scope of the Code to the public.
2. No free samples to mothers.
3. No promotion of products in health-care facilities, including the distribution of free or low-cost supplies.
4. No company representatives to advise mothers.
5. No gifts or personal samples to health workers.
6. No words or pictures idealizing artificial feeding, including the pictures of infants on the labels of the product.
7. Information to health workers should be scientific and factual.
8. All information on artificial feeding, including the labels, should explain the benefits of breastfeeding and all costs and hazards associated with artificial feeding.
9. Unsuitable products, such as sweetened condensed milk, should not be promoted for babies.
10. All products should be of a high quality and take into account the climatic and storage conditions of the country where they are used.
11. Foster appropriate complementary feeding from the age of about six months, recognizing that any food or drink given before complementary feeding is nutritionally required may interfere with initiation or maintenance of breastfeeding.
12. Ensure that complementary foods are not marketed for or used in ways that undermine exclusive and sustained breastfeeding.
13. Financial assistance from the infant feeding industry may interfere with professionals' unequivocal support for breastfeeding and should be avoided.

\* WHO: World Health Organization; UNICEF: United Nations Children's Fund; WHA: World Health Assembly; Adapted from World Health Organization: International Code of Marketing of Breast-Milk Substitutes, WHO, Geneva, 1981 and subsequent WHA resolutions.<sup>73</sup>

longer women breastfeed, the more they are protected against breast cancer. Breastfeeding also gives the mother a sense of fulfillment and enhances maternal-infant bonding.

## Economic Benefits

From the economic perspective, breastfeeding is less expensive than formula feeding. Breastfeeding is environmentally friendly. The decreased rates of various illnesses in breastfed infants translate into savings for medical care. Exclusive breastfeeding also promotes child-spacing.<sup>30</sup>

## POTENTIAL CONTRAINDICATIONS TO BREASTFEEDING

### Drugs

Generally, drugs given to nursing mothers appear in only small amounts in human milk, usually <1% of the maternal dosage.<sup>30</sup> Most drugs are safe in the breastfed child. Several drugs, however, because of their high excretion into the breast milk and their toxicity, should be avoided during lactation (Table 1).<sup>3,10,30,51,52</sup> In addition, lithium, prozac, amniodarone, clofazimine, lamotrigine, ergotamine, mefloquine, ganciclovir, cyclosporine, anticonvulsants, anticoagulants, antidepressants, tetracycline, sulfa drugs, gold salts, metronidazole and salicylates may have effects on some breastfed infants and may be of concern.<sup>10,52-55</sup> For the limited number of drugs that are contraindicated during lactation, a safe alternative medication can usually be found. Bromocriptine should be avoided during lactation as it may inhibit milk production.<sup>10</sup>

### Environmental Chemical Agents

Maternal exposure to low-level environmental chemical agents, such as organochlorine compounds, is not a contraindication to breastfeeding.<sup>56,57</sup>

### Maternal Infections

In most cases, maternal infections are not contraindications to breastfeeding. For most infections, infants have already been exposed to the infectious agents during the prodromal period, and to interrupt breastfeeding at a time when antibodies are being provided by breastfeeding is counterproductive.<sup>58</sup>

Tuberculosis is rarely transmitted by breast milk but can be transmitted by exposure to the sputum from an infected mother.<sup>3</sup> As such, mothers with untreated active tuberculosis should not be in contact with their infants, regardless of the mode of feeding.<sup>58</sup> Mothers with active tuberculosis may breastfeed their infants only after they have received adequate therapy and are considered noninfectious.<sup>3</sup>

Neonatal herpes virus infection can be very

severe. Nevertheless, a mother with active herpes virus infection can continue breastfeeding, provided there is no active herpetic lesions on or near the nipple.<sup>58</sup> If a herpetic lesion is present on or near the nipple, breastfeeding is contraindicated.<sup>58,59</sup>

Human immunodeficiency virus (HIV) can be transmitted from the mother to her infant during pregnancy or breastfeeding. The transmission rate of HIV through breastfeeding is 5–20%.<sup>58</sup> In developed countries, it is recommended that HIV-infected mothers not breastfeed their infants.<sup>60</sup> In developing countries, when children born to women living with HIV can be ensured uninterrupted access to nutritionally adequate breast milk substitutes that are safely prepared and fed to them, they are at less risk of illness and death if they are not breastfed.<sup>61</sup> When these conditions are not fulfilled—in particular, in an environment where infectious diseases and malnutrition are the primary causes of death during infancy, artificial feeding substantially increases children's risk of illness and death.<sup>62</sup> In most countries, policy must cover a range of socioeconomic conditions, and the aim should be to promote and protect breastfeeding for the majority of women while offering as much choice as possible to women who are HIV-positive, enabling them to decide what is most appropriate for their circumstances and supporting them in their choice.<sup>61</sup>

### Certain Metabolic Disorders

In infants with galactosemia, galactose must be excluded from the diet early in life to avoid cirrhosis of the liver, mental retardation, cataracts and hypoglycemia. As such, breastfeeding is contraindicated in infants with galactosemia.

Infants with phenylketonuria, because of the deficiency of phenylalanine hydroxylase, are unable to degrade phenylalanine via the tyrosine pathway. Because breast milk is low in phenylalanine, such infants may be partially breastfed provided they can be supplemented with an approximate amount of phenylalanine-free formula and are closely monitored.<sup>58</sup>

### Breast Cancer

A mother with a newly diagnosed breast cancer probably should not breastfeed her infant since prolactin levels remain high during lactation, and the role of prolactin in stimulating the growth of breast cancer is still in dispute.<sup>63</sup> On the other hand, the fear of cancer in the breastfed female offspring of a women with breast cancer does not justify avoiding breastfeeding.<sup>63</sup>

## MANAGEMENT OF COMMON BREASTFEEDING ISSUES

### Breast Engorgement

Postpartum engorgement is a transitory condition

due to lymphatic and vascular congestion, which prevents adequate milk flow. Engorgement can result in discomfort, difficulty in establishing milk flow and difficulty in latch-on.<sup>64</sup> Engorgement can be prevented by early, effective and frequent nursing. Management includes rest and hand expression or pumping before nursing, to soften the breast and to enhance maternal comfort.<sup>2</sup> The use of alternating warm and cold compresses and mild analgesics, such as ibuprofen, may sometimes be necessary.<sup>2</sup>

## **Oversupply or Overactive Milk Ejection Reflex**

Hyperactive let-down may result in premature weaning, gas and breast refusal when milk overwhelms the infant. Management includes removing the infant from the breast when let-down occurs and waiting for the milk flow to slow down before putting the infant to the breast.<sup>64</sup>

## **Plugged Ducts**

Plugged ducts may result from an overly copious milk supply, a tight bra or incomplete emptying of the breast.<sup>65</sup> Clinically, a plugged duct may manifest as a white spot on the nipple or as a breast lump. There may be mild, local tenderness. Treatment consists of application of heat and massage towards the nipple, together with frequent nursing in a variety of positions.<sup>65</sup>

## **Inverted Nipples**

Infants are breastfed and not nipple-fed. As long as the degree of inversion does not affect the ability of the infant to grasp the areolar tissue and draw the nipple into the mouth, there is no reason why a mother with inverted nipples should not be able to breastfeed.<sup>30,66</sup> Treatment consists of gently rolling the nipples between the thumb and index finger before feeding to help the nipples stand up.<sup>30</sup> Some breastfeeding experts believe that proper latch-on of the infant will overcome flat or inverted nipples.

## **Sore Nipples**

Nipple soreness is often the result of trauma from poor positioning and latch-on of the infant during breastfeeding and, if uncorrected, may lead to cracked nipples and breast infection.<sup>30</sup> Sore nipples can be managed by proper positioning of the infant's mouth on the nipple, alternating nursing positions with each feeding and optimizing nipple care.<sup>7,65</sup> Engorgement and monilia infections of the nipple may also contribute to nipple soreness which, if present, should be treated appropriately.

## **Mastitis**

Approximately 1–5% of nursing mothers experience mastitis.<sup>30</sup> Predisposing factors include a

decrease in nursing frequency leading to milk stasis, inadequate drainage in a mother with an abundant milk supply, cracked nipples and fatigue.<sup>2</sup> The usual causative organism is *Staphylococcus aureus*.<sup>2</sup> Less commonly, it may be caused by *Escherichia coli*, *Klebsiella pneumoniae* and *Streptococcus species*. Treatment consists of heat, massage, continued breastfeeding, rest and the judicious use of analgesics and antibiotics.<sup>65</sup>

## **Monilia Infection**

Monilia infection of the nipple has been associated with nipple damage, use of antibiotics, maternal monilia vaginitis during pregnancy and thrush in the infant.<sup>65</sup> The condition usually presents as intense, burning pain in the nipples when nursing. The nipples and areolae also may be red and itchy. Treatment consists of topical application of nystatin cream. In resistant cases, ketoconazole or fluconazole can be used. Both the mother and the infant should be treated if monilia infection is diagnosed on either the mother's breast or in the infant's mouth.<sup>2</sup>

## **Breast Abscess**

Breast abscess may result from untreated mastitis or mastitis complicating a plugged duct.<sup>65</sup> Treatment consists of incision and drainage, antibiotic therapy and analgesics. The affected breast should be emptied by gentle mechanical pumping, and the infant should continue to feed from the opposite breast.<sup>65</sup>

## **Mammoplasty**

In general, breastfeeding is usually possible with augmentation surgery or mastopexy.<sup>2</sup> The ability to breastfeed after reduction surgery depends on whether the nerve and blood supply to the nipple and areola are completely severed.<sup>66</sup>

## **Insufficient Milk**

Insufficient milk may be secondary to congenital mammary hypoplasia/aplasia, postmastectomy or after reduction surgery, infrequent or incomplete breast emptying, anxiety, exhaustion, inadequate maternal diet, or heavy smoking.<sup>7,67</sup> The condition is more common in primiparous women.<sup>11</sup> The underlying cause should be treated if possible. One should always correct the latch first. Frequent nursing, i.e. once every two hours, should be encouraged. Breast compression can be used to increase milk supply. With a continued problem of supply, mechanical pumping and the use of domperidone may increase milk production, and this may be worth a trial.<sup>2</sup> The recommended dose of domperidone is 20 mg QID. If there is no improvement within a few days, the dose may be increased to 30 mg QID. Once the mother's milk production is sufficient for the baby to

**Table 5. Role of Physicians in Promoting and Protecting Breastfeeding**

1. Promote, support and protect breastfeeding enthusiastically. In consideration of the extensively published evidence for improved health and developmental outcomes in breastfed infants and their mothers, a strong position on behalf of breastfeeding is warranted.
2. Promote breastfeeding as a cultural norm and encourage family and societal support for breastfeeding.
3. Recognize the effect of cultural diversity on breastfeeding attitudes and practices and encourage variations, if appropriate, that effectively promote and support breastfeeding in different cultures.
4. Become knowledgeable and skilled in the physiology and the current clinical management of breastfeeding.
5. Encourage development of formal training in breastfeeding and lactation in medical schools, in residency and fellowship training programs, and for practicing pediatricians.
6. Use every opportunity to provide age-appropriate breastfeeding education to children and adults in the medical setting and in outreach programs for student and parent groups.
7. Work collaboratively with the obstetric community to ensure that women receive accurate and sufficient information throughout the perinatal period to make a fully informed decision about infant feeding.
8. Work collaboratively with the dental community to ensure that women are encouraged to continue to breastfeed and use good oral health practices.
9. Promote hospital policies and procedures that facilitate breastfeeding. Work actively toward eliminating hospital policies and practices that discourage breastfeeding. Encourage hospitals to provide in-depth training in breastfeeding for all healthcare staff and have lactation experts available at all times.
10. Provide effective breast pumps and private lactation areas for all breastfeeding mothers in ambulatory and inpatient areas of the hospital.
11. Develop office practices that promote and support breastfeeding by using the guidelines and materials provided by the American Academy of Pediatrics Breastfeeding Promotion in Physicians' Office Practices program.
12. Become familiar with local breastfeeding resources so that patients can be referred appropriately. When specialized breastfeeding services are used, the essential role of the pediatrician as the infant's primary healthcare professional within the framework of the medical home needs to be clarified for parents.
13. Encourage adequate, routine insurance coverage for necessary breastfeeding services and supplies, including the time required by pediatricians and other licensed healthcare professionals to assess and manage breastfeeding and the cost for the rental of breast pumps.
14. Develop and maintain effective communication and coordination with other healthcare professionals to ensure optimal breastfeeding education, support and counseling.
15. Advise mothers to continue their breast self-examinations on a monthly basis throughout lactation and to continue to have annual clinical breast examinations by their physicians.
16. Encourage the media to portray breastfeeding as positive and normative.
17. Encourage employers to provide appropriate facilities and adequate time in the workplace for breastfeeding and/or milk expression.
18. Encourage child care providers to support breastfeeding and the use of expressed human milk provided by the parent.
19. Support the efforts of parents and the courts to ensure continuation of breastfeeding in separation and custody proceedings.
20. Provide counsel to adoptive mothers who decide to breastfeed through induced lactation, a process requiring professional support and encouragement.
21. Encourage development and approval of governmental policies and legislation that are supportive of a mother's choice to breastfeed.
22. Promote continued basic and clinical research in the field of breastfeeding. Encourage investigators and funding agencies to pursue studies that further delineate the scientific understandings of lactation and breastfeeding that lead to improved clinical practice in this medical field.

Adapted from: Section on Breastfeeding, American Academy of Pediatrics. Breastfeeding and the use of human milk. *Pediatrics* 2005;115:496-506.<sup>77</sup>



gain weight without having to supplement with formula, the dose of domperidone can be gradually decreased. Supplementation with an appropriate formula is indicated if the infant's weight gain is unsatisfactory or if the infant appears to be dehydrated.<sup>65,67</sup>

## Breastfeeding and Breast Milk Jaundice

Two types of jaundice associated with breastfeeding are recognized. The first type is early-onset breastfeeding jaundice or "breast-nonfeeding jaundice" due to infrequent or ineffective breastfeeding.<sup>44</sup> The caloric deprivation and reduced frequency of breastfeeding may increase the enterohepatic circulation of bilirubin and cause the jaundice.<sup>44</sup> Breastfeeding jaundice can be prevented or treated by encouraging mothers to nurse as frequently as possible. The second type is later onset, prolonged jaundice, known as breast milk jaundice. Breast milk jaundice affects 2–4% of breastfed infants and is associated with one or more factors in the maternal milk itself. Pregnen-3 $\alpha$ , 20 $\beta$ -diol, free fatty acids,  $\beta$ -glucuronidase and a factor in human milk that increases intestinal bilirubin absorption have been implicated as the possible culprits.<sup>68,69</sup> The severity of jaundice can be reduced by phototherapy, when appropriate, and by early optimal breastfeeding.<sup>30,69</sup> This latter step would minimize the accumulated effects of early breastfeeding jaundice. Supplementation with water or glucose water should be avoided, as this reduces breastfeeding frequency and milk production, leading to the infant's decreased caloric intake or starvation.<sup>69</sup> Breastfeeding should not be interrupted unless the unconjugated bilirubin level reaches 425  $\mu$ mol/L. Bilirubin encephalopathy may occur if the unconjugated bilirubin exceeds that level.<sup>69</sup> These nursing mothers should be provided with positive and enthusiastic support and encouraged to maintain lactation using a breast pump or manual expression during the period of interrupted nursing.<sup>2</sup> When the serum bilirubin decreases to a reasonable level, breastfeeding may be resumed.<sup>2,68</sup>

## WHEN AND HOW TO BREASTFEED

Breastfeeding should be initiated as soon after delivery as possible, preferably within the first half-hour after birth.<sup>2</sup> Delaying breastfeeding for four hours or more results in a lower incidence of successful breastfeeding.<sup>53</sup> Mothers should be encouraged to nurse on cue, usually 10–12 times a day, including during the night, for as long as the infant seems interested. Frequent feeding is important in establishing a good milk supply.<sup>2</sup> Supplementary feeding of water, glucose water or formula should be avoided, as these fluids tend to mute the appetite and interfere with lactation.<sup>5,10</sup> Proper positioning pro-

vides comfort for the mother and the infant and is important in the establishment of an effective latch-on and adequate milk intake for the infant. The most frequently used positions that work well are the cradle position, football position and side-lying position.<sup>30</sup> Enough of the areola should be in the infant's mouth to permit the tongue to compress the areola overlying the collecting ducts against the hard palate.<sup>10</sup> The time for suckling should be unrestricted as time for complete milk transfer varies. Signs of successful breastfeeding are listed in Table 2.<sup>30,70</sup> While it is possible that a healthy, breastfed infant may not meet all these criteria, failure to do so warrants a careful assessment of the situation.

Ideally, infants should be exclusively breastfed for the first six months of life.<sup>5</sup> Breastfeeding should be continued with the addition of complementary food, at least through the first 12 months and breastfeeding continued for as long as the mother and infant mutually desire.<sup>5</sup> Breastfeeding for the first two years of life should be encouraged.<sup>71</sup>

## PROMOTING AND SUPPORTING BREASTFEEDING

To promote, protect, and support breastfeeding, the WHO and UNICEF developed the Babyfriendly® Hospital Initiative (BFHI) 10 Steps to Successful Breastfeeding.<sup>72</sup> The suggested 10 steps are listed in Table 3. A Babyfriendly® hospital should adhere to the WHO/UNICEF International Code of Marketing of Breast-Milk Substitutes and subsequent World Health Assembly (WHA) resolutions (Table 4).<sup>72</sup> The code seeks to protect breastfeeding by preventing inappropriate marketing of breast milk substitutes, feeding bottles, soothers and complimentary foods when used to replace breast milk. Interventions, such as antepartum structured educational programs, postpartum support, rooming-in, proper advice to overcome breast-related problems, and peer counseling and encouragement have been shown to improve the initiation and duration of breastfeeding.<sup>74–77</sup> Physicians should provide encouragement, advice and support to help mothers to continue breastfeeding after they return to work.<sup>78</sup> Physicians should promote adoption of international, national and local policies that clearly support breastfeeding.<sup>79</sup> Breastfeeding mothers should be given the names of breastfeeding resources or support groups and information about legislation affecting breastfeeding in their area.<sup>78</sup> Working mothers may consider the use of breast pumps or arrange to have the infant brought to the workplace to be breastfed there.<sup>78</sup> Working part-time, job-sharing or arranging to do some work at home are other possibilities.<sup>78,79</sup> The role of pediatricians in promoting and protecting breastfeeding has been outlined by the American Academy of Pediatrics (Table 5). Pediatricians/family physicians are urged to follow the rec-



ommendations so as to provide an optimal environment for breastfeeding. Physicians should be encouraged to have their offices breastfeeding-friendly.

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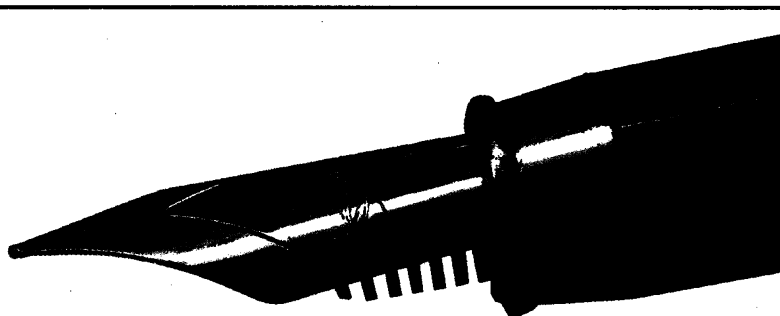
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